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Application Serial No. 10/578,390
Reply to final office action of June 9, 2009

PATENT
Docket: CU-4805

Remarks and Arguments

Reconsideration is respectfully requested.

Claims 1-13 are pending in the present application before this amendment. By the present amendment, claims 1, 10, and 13 have been amended. No new matter has been added.

In the office action (page 2), claims 1-13 stand rejected under 35 U.S.C. §112, ¶2 as being indefinite. With respect to the rejections of claim 1, 10, and 13, the applicants have amended the claims to more clearly recite the subject matter of the present invention. More particularly, the applicants have amended the claims such that the sweep phase is ~~—until for deleting all the listed objects of the first list—~~. That is, as amended, the claims now recite that the sweep phase is **for deleting the listed objects** and does not claim deleting all objects in a single sweep phase.

As to the second rejection with respect to claim 1 in which claim 1 recites "according to the first list of objects to be deleted," this limitation has been deleted. Therefore, the applicants respectfully submit that the calculation of the residual time is clear in amended claim 1. Accordingly, the applicants respectfully request withdrawal of the outstanding 35 U.S.C. §112, ¶2 rejections.

In the office action (page 3), claims 1-4, 6, 10 and 13 stand rejected under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 5,485,613 (Engelstad) in view of U.S. Patent No. 5,640,529 (Hasbun). The "et al." suffix is omitted.

The applicants respectfully **disagree**.

In the previously filed response, the applicants amended claims 1, 10, and 13 to more clearly recite that the presently claimed invention separates the mark and the sweep phase, thereby allowing the sweep phase to be performed until all the objects of the list of objects to be deleted are deleted. The applicants previously argued that Engelstad, which is relied upon by the examiner as teaching the sweep phase being performed over multiple communication cycles, teaches garbage reclamation as a series of tasks (Engelstad col. 27, lines 17-22). One of these tasks is the freeing of an object, i.e., the actual deletion of an object to free space. As noted in the previous

Application Serial No. 10/578,390
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response, the "Free[ing of] an object" is a **single** task (Engelstad col. 27, lines 17-22).

According to Engelstad, a "task is an **indivisible** portion of the garbage collector's work" and "[e]ach task must complete within **one** cycle" (Engelstad col. 12, lines 1-7). The examiner acknowledges that a task is indivisible and must be completed within one cycle on page 12 of the current office action. However, the examiner argues that the mark and sweep phase of Engelstad are in different phases and therefore teaches the presently claimed invention (office action page 12).

Although Engelstad teaches a plurality of phases including a phase to mark objects, e.g., phase 6, and a garbage reclamation phase, e.g., phase 8, the examiner ignores the disclosure of Engelstad that teaches each phase is comprised of a plurality of tasks. As clearly described in Engelstad col. 27, lines 9-22, Phase 8 "Garbage Reclamation" consists of 5 tasks. As previously stated, Engelstad **explicitly** states that the tasks are indivisible and must be completed within one cycle. Of these 5 tasks, a singular task is "Free an object" and is relied upon by the examiner on page 5 of the office action. That is, the examiner analogizes the task of "Free an object" to the sweep phase of the present invention according to the rationale presented on page 5 of the office action.

However, the examiner further relies on FIG. 4 of Engelstad, and more specifically step 412 (office action page 5). However, this does not teach the presently claimed invention. In the presently claimed invention, the mark and sweep phase are first performed in a communication cycle. In subsequent communication cycles, **only** the sweep phase is performed until all the objects are deleted from the memory. However, Engelstad does **not** teach any comparable process. Rather, FIG. 4 of Engelstad shows two decision blocks in the real-time garbage collection, i.e., 412 and 416. In step 412, as relied upon by the examiner, a determination is made as to whether the cost from the cost determined box 410 is greater than the real-time segment allocated (Engelstad col. 13, lines 7-13). From Engelstad "if the cost is greater than or equal to the time segment, then the garbage collector has performed as many tasks as can be accomplished during a real-time cycle" (Engelstad col. 13, lines 9-13). That is, decision block 412 does not teach a task being partially completed and fully completed later as in the presently claimed invention, but rather determines if a task can be **fully**

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completed.

Decision block 416 of FIG. 4 of Engelstad is shown as determining whether the entire phase is complete. Applying the flow chart to the phases of Engelstad illustrates a completely different method than that of the presently claimed invention. According to Engelstad, the **single task** of freeing an object **must be** completed in a single cycle and therefore according to FIG. 4, decision block determines if the **singular task** can be completed within the real-time segment. If so, the task is completed. If not, the cycle is ended and the task is performed in a subsequent cycle. However, this is **no way** teaches the sweep phase, i.e., the deletion of objects, being performed multiple times -- **until all the objects of the first list are deleted from the memory--** as in the presently claimed invention.

The examiner appears to be incorrectly analogizing Engelstad and the presently claimed invention. That is, the examiner appears to be asserting that because Engelstad illustrates in FIG. 4 that if the phase is not complete, to return and finish the phase is another cycle, that it teaches repeatedly performing the sweep phase. This is a mischaracterization of Engelstad. All Engelstad teaches is that the phase is complete when all 5 tasks are completed, each of which being completed within one cycle. Therefore, if all 5 tasks are not completed in one cycle, a subsequent cycle is used to performing the remaining tasks. Accordingly, the task of "free an object" will be performed only **once** during the "Garbage Reclamation" phase 8.

To more clearly reflect these differences, claims 1, 10, and 13 have been amended to recite, inter alia:

-- and wherein, if objects to be deleted remain after performing the mark phase and the **first** sweep phase during the communication cycle, **performing only the a** sweep phase ~~is performed during the other subsequent~~ communication cycles **until all the objects of the first list are deleted from the memory--**

There is no comparable teaching found within Engelstad as alleged. Again, Engelstad teaches a single task having to be completed in a single cycle. The "Garbage Reclamation" phase includes a single task for freeing an object. According to Engelstad, that single task is performed in one cycle and is not divisible. Nothing in FIG. 4 of Engelstad teaches the contrary. There is **no** teaching in Engelstad that if all objects are

Application Serial No. 10/578,390
Reply to final office action of June 9, 2009

PATENT
Docket: CU-4805

not deleted, performing only the sweep phase during subsequent cycles until all objects are deleted. That would require Engelstad to teach performing the "free an object" task multiple times and there is no such teaching.

Further, Engelstad performs garbage collection according to a cycle steal interval N (Engelstad col. 11, lines 44-52). The cycle steal interval is a variable that is adjusted to the conditions of the system. Accordingly, Engelstad teaches that a decaying rate must be checked in order to adjust the cycle steal variable (Engelstad col. 27, lines 24-36). Engelstad specifically acknowledges, "a pre-selected number of objects are to be allocated during the phase" (Engelstad col. 27, lines 30-31). That is, Engelstad is aware that only a limited number of objects can be allocated, and therefore, the cycle steal interval, i.e., the frequency at which garbage collection is to occur, should be adjusted so that the **entire** garbage collection process can be performed again to accomplish an adequate decay rate. This is completely contrary to the present invention in which **only** the sweep phase is repeatedly performed until all objects on the list are deleted. There is no decay rate calculation since the performing of the sweep phases are not finished until all objects on the list are deleted.

Finally, the examiner asserts on page 11 of the office action that the language of scanning the entire memory is not in the claims. By the present paper, claims 1, 10, and 13 have been amended to recite, inter alia: --the entire writeable non-volatile memory space--. The support for these amendments can be found in the specification page 7, lines 12-18.

Therefore, the applicants respectfully re-submit their arguments made in the previous office action response filed on March 12, 2009 in which the applicants argued that Engelstad does **not** teach scanning the --entire writeable non-volatile memory space--, but rather is focused only on a previously designated condemned region.

Accordingly, the applicants respectfully submit that neither Engelstad nor Hasbun, whether considered individually or in combination, teach or suggest the limitations of independent claims 1, 10, and 13 since neither of the cited prior art references teach repeatedly performing the sweep phase --until all the objects of the first list are deleted from the memory-- and marking objects in the -- entire writeable

Application Serial No. 10/578,390
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non-volatile memory space--. Therefore, the applicants respectfully request withdrawal of the outstanding rejections and earnestly solicit an indication of allowable subject matter.

As to claims 2-9 and 11-12, the applicants respectfully submit that these claims are allowable at least since they depend from independent claims 1 and 10 which are now considered to be in condition for allowance for the reasons set forth above. Accordingly, the applicants respectfully request withdrawal of the outstanding rejections and earnestly solicit an indication of allowable subject matter.

For the reasons set forth above, the applicants respectfully submit that claims 1-13, pending in this application, are in condition for allowance over the cited references. Accordingly, the applicants respectfully request reconsideration and withdrawal of the outstanding rejections and earnestly solicit an indication of allowable subject matter. This amendment is considered to be responsive to all points raised in the office action. Should the examiner have any remaining questions or concerns, the examiner is encouraged to contact the undersigned attorney by telephone to expeditiously resolve such concerns.

Respectfully submitted,

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